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TA SPUTTERING TARGET AND ITS MANUFACTURING METHOD

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Abstract

Objective

To establish a means to obtain a uniform, high-performance thin film in a stable manner from sputtering using a Ta sputtering target.

Constitution

A Ta sputtering target is constituted by a plastic processing material of Ta prepared by melting with a total gas component content of less than 100 ppm and an average crystal particle diameter of less than 1 mm. Furthermore, for the

manufacture of this Ta sputtering target, after cold forging of a Ta ingot with a total gas component content of less than 100 ppm at a processing ratio of more than 90%, a process is adopted in which a heat treatment is carried out in a vacuum less than 0.1 mmbar at a heating temperature of 900-1300°C to cause recrystallization.

Claims

1. A Ta sputtering target characterized by the fact that it consists of a plastic processing material of Ta prepared by melting with a total gas component content of less than 100 ppm and an average crystal particle diameter of less than 1 mm.

2. A method for the manufacture of the Ta sputtering target described in Claim 1, characterized by the fact that it includes a process in which a heat treatment is carried out in a vacuum less than 0.1 mmbar at a heating temperature of 900-1300°C to cause recrystallization, after cold forging of a Ta ingot with a total gas component content of less than 100 ppm at a processing ratio of more than 90%.

Detailed explanation of the invention

[0001]

Industrial application field

The present invention relates to a Ta (tantalum) sputtering target appropriate for the manufacture of semiconductor devices,

the coating of thermal ray absorption glass for automobiles and the like, as well as its manufacturing method.

[0002]

Conventional technology and its problems

Conventionally, a SiO_2 film has been used as an insulating film between electrode wiring layers in a semiconductor device. However, partly due to dissatisfaction with the SiO_2 film owing to the high integration of LSI in recent years, attempts to use a Ta_2O_5 thin film instead of the SiO_2 film have proceeded.

[0003]

In the formation of this Ta_2O_5 thin film, a CVD method using an organic reaction gas and a sputtering method for the sputtering of a Ta sputtering target (to be simply called "Ta target" hereafter) in an "argon-oxygen mixed gas" have been used. From the overall viewpoint, the sputtering method is more advantageous.

[0004]

As electrodes of VLSI, Mo, W and other high melting point metal silicide thin films have been used to date. However, in recent years, the Ta silicide film has drawn attention. It has been considered as a promising electrode material for the future. In the formation of a Ta silicide film, several methods can also be considered. As one of them, a Ta film is adhered to